DOCUMENT RESUME

ED 226 556 EC 151 043

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TITLE Motivating Behavioral Change. Revised.
INSTITUTION Children's Hospital Medical Center of Akron, OH.; Kent State Univ., Ohio.
SPONS AGENCY Special Education Programs (ED/OSERS), Washington, DC.
PUB DATE Jan 82
GRANT 300-77-0249; G007801682; G007903069; G007903259
NOTE 54p.
AVAILABLE FROM Children's Hospital Medical Center of Akron, 281 Locust St., Akron, OH 44308 ($7.50).
PUB TYPE Tests/Evaluation Instruments (160) -- Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Behavior Change; Behavior Modification; *Contingency Management; *Disabilities; Elementary Secondary Education; Records (Forms); Reinforcement; Severe Disabilities; *Student Motivation

ABSTRACT

The manual describes approaches the teacher or therapist can use to motivate handicapped students. Chapter 1 considers motivation in terms of the consequences of an action, contingency awareness, and types of motivating conditions. A second chapter offers guidelines for identifying potential reinforcers and discusses examples of motivating severely handicapped students. The third chapter explains the concept that a consequence is what a consequence does to a child's motivation. The final chapter examines antecedent events in instruction (multiple stimulus control, physical guidance, prompting, and stimulus properties) and considers programing of antecedent events. Appended are sample procedures and data sheets for determining motivators, and information and forms relating to identification of potential motivators. (SW)

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MOTIVATING BEHAVIORAL CHANGE

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Preparation of this module was funded in part from USOE/BEH Grants Nos. G00-79-03069, G00-78-01682, 300-77-0249 to Children's Hospital Medical Center of Akron, and in part from USOE/BEH Grant G00-79-03259 to Kent State University.

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INTRODUCTION

Motivation has to be one of the most difficult problems for teachers of the handicapped student. One of the reasons for this difficulty is that the process referred to by the term motivation is extremely vague. At first blush, we can say that we are motivated to do whatever we end up doing and we are not motivated to do that which we put off or do not do at all. This is really not a bad point to begin an analysis of motivation, since one condition of understanding motivation is the fact that the person knows how to do whatever it is that has to be done and actually has a choice in deciding whether to do it. This means that no learning is required in order to make behavior change. All that we have to do is find some good reason for a student (or anyone else) to do what we want him/her to do. If we can find a good reason to do something, and we know how to do it, then we will generally perform the necessary activity. What are some good reasons for doing things? We wash the car to make it look good, to take the salt off, to protect the paint, to get it ready for waxing, or to find out if it is the same color as it was the previous fall. We may paint pictures, make jewelry, bowl, or grow roses simply for the pleasure of having something happen as a consequence of our own actions. We may work only because of the paycheck or we may also enjoy the activity involved in our job. We may do some things in order to not feel guilty about them later, such as sending a gift to a charity, or we may do the same thing because we experience satisfaction that we were able to help someone in need. We may do something, like give money, for more than one reason. There are almost no limits to the number of examples of motivation that make people do things so that it would be impossible to describe motivation other than by two unifying principles. First, the person already knows how to engage in the relevant activity and, second, there is some consequence of acting that the person "wishes" to experience.

When we encounter a student who has been classified as handicapped, one of the first characteristics that may stand out is the apparent lack of behavior. There may be limited movement and what movement there is may be repetitive and relatively primative. When asked or prompted to do something, the student may simply stare blankly or smile broadly with little other recognition. The vocalizations may tend to sound like prolonged vowels with some back consonants like /k/ or /g/. We will deal with each of these aspects of behavior later; the important point here is that, with such a student, there doesn't seem to be much motivation for doing age appropriate activities and there is not much compliance with requests to do certain things. The apparent lack of behavior is tremendously bothersome because the absence of behavior can be related to the two distinct processes mentioned above. The first is that the student is unable to emit a required action and, therefore, cannot perform, regardless of motivation. And the second is that the student can perform, but isn't motivated to do so. In working with students who are in the handicapped population, we should begin by assuming that the student can do what we ask, but isn't motivated to do so. This is reasonable since changes in motivation might bring the desired form of behavior into rapid existence, which means that there is no need to teach it.

Even if changes in motivation alone don't produce behavior, we haven't wasted any time, since we need a motivated student before we can be expected to teach new behavior. The purpose of this manual is to describe ways in which handicapped students can be motivated and how we, as teacher or therapist, can continue to find and use a multitude of motivating conditions with these students.

OPERATIONALIZING MOTIVATING CONDITIONS

There are a number of ways in which we can describe the conditions that appear to motivate the behavior of a student. We could say that s/he will do something because it meets his/her needs; s/he does it because it is of interest to him/her; s/he does it because s/he wants to do it; s/he does it because s/he finds it reinforcing; s/he does it because I told him/her to do it; s/he does it because s/he knows what would happen if s/he didn't; s/he wants to do that because all of his/her friends are doing it; s/he does it because it is his/her duty to do it; or s/he does it just for the hell of it! There seem to be almost as many different ways of describing the characteristics of motivation as there are things that a person is motivated to do. Since we would probably exhaust ourselves before we would complete a list of motivating properties, we might start from the other end and attempt to determine how few groups of motivating conditions we can identify that seem to account for most of the particular instances.

Examining the Consequences of an Action

The first issue to consider is the extent to which motivation can be understood by examining the consequences of an action. This can be somewhat confusing because motivational states such as needs, interests, goals, desires, fears, and such seem to be antecedent to the behavior which they apparently motivate. Certainly we are hungry before we might say that we are motivated to cook, or at least we know that we are generally hungry before we are motivated to eat. To understand this situation as one that is dependent upon consequences, we must view motivation developmentally. A young infant will cry when s/he has been deprived of food for three or four hours and the delivery of food will not only stop the infant's crying, but will also generally keep the infant quiet for a period of time after feeding. We could say that the feelings of discomfort associated with a few hours of food deprivation motivate or cause the baby to cry. However, if we would systematically attempt to feed the baby only when it has been quiet for a period of five or more minutes and we did this for a couple of weeks, then the baby would not cry within the usual period of time relative to his/her deprivation, so that we could no longer say that hunger made the infant cry. This happens in all children over a much longer period of time, in that as they grow older they learn to say "I'm hungry!" after a period of deprivation, rather than crying. Still later, they may ask if they can make

themselves a sandwich, a bowl of soup, or even an entire dinner. As adolescents or adults, we no longer ask permission, but prepare food whenever we are in the process of becoming hungry. When considered in this way, we can see that two things remain constant -- namely, the internal discomfort associated with lack of food over a period of time and the consequence of behavior or the food itself. We would propose that the food consequence has more to do with the development of behavior (as with the emerging success story from crying to making one's own meal) than the existence of the deprivation-produced discomfort. We would also point out that crying of an infant can signal being cold, wet, bored, hot, or in some form of mild pain or discomfort. In these situations, the parent has to guess which condition is producing the crying. When the toddler learns to talk, the parent makes this easy on himself/herself by asking the child, "Are you cold?" "Are you wet?", etc., until the child says, "Yes!" At a still later stage, the parent will ask, "What is the matter?" or "What do you want now?" and will then provide the requested item (assuming it is allowable). In the final stages of development, the parent responds to requests with the statement, "Why are you bothering me? You know where your football shirt is." In the last stage, everything comes together in that the child or adolescent knows when snacks are appropriate given the time of day, and that she need not ask the parent in the particular instance. Here we find not only the developmental sequence, but some possible reasons in terms of parent reactions to behavior that produce the observed changes in the structure of behavior.

We need not become so speculative in trying to demonstrate the importance of consequences in motivation when we are attempting to work with handicapped students. Since a very large number of these students do not talk early or well, we are in the same situation as a parent with a crying infant. We simply have to try a number of different alternatives until we find the one that the student will accept and the one that will stop the indications of distress. This is the first method for determining conditions of motivation in that distress relating to various accepted consequences are usually related to time and other conditions so that the teacher can quickly judge which state of motivation the student is in. Once we have some idea what it is that will reduce the indication of distress by the student, we are in a position to ask a behavioral question. For example, we may know that the student is thirsty because fluids have generally been accepted in the set of conditions operating when the inference is made. We can then show the student a glass of water and a cracker and ask the student to point to what s/he wants. If s/he doesn't do anything, we may try to physically guide a pointing movement to see if the student gets the idea of indicating what s/he wants. By doing this, we attempt to determine if the student can do more than simply signal distress in order to get what s/he obviously wants. If none of this works, then we simply give him/her the fluid and determine a program plan concerning how we might teach the student to point to what he/she wants. This knowledge of motivaton, according to time and conditions, sets the stage for a number of different instructional plans relating to food, drinking, toileting, and dressing. But first we check the ability of the student by allowing him/her to make a specific signal when we know that he/she is indicating some sort of need.

Contingency Awareness

Let us take a closer look at motivation and how we can operationalize events that might motivate handicapped children. One place to look is at research that has been done during the past few years with infants. A good example is from the work of John Watson, who has coined the phrase "contingency awareness" (Watson & Ramey, 1972). He worked with infants who were about six weeks of age. They were placed in a crib equipped with a mobile about 18 to 20 inches above the eyes of the infant and the infant's head was on a double chamber air pillow. If the infant moved his/her head either to the right or left, the pressure of his/her head on the pillow caused a counter to indicate either a right or a left head movement. After a few minutes, a reading was taken to determine to which side the infant turned most frequently. If movements to the right were more frequent than to the left, then any movement of the head to the left would cause the mobile to rotate one full rotation. If the infant favored the left side, then any right side movement would activate the mobile. The outcome was interesting, in that the majority of infants quickly shifted to the previously nonpreferred side while watching the mobile. Thus, the movement of the mobile was determined to be a motivating condition for six-week-old infants because activation of the mobile seemed to cause infants to shift from a previously preferred movement of the head to a particular side to the previously nonpreferred side. We know from the data that the infants knew how to move their heads to the nonpreferred side and that the consequences of making the mobile move was all that was necessary to change head position. On the other hand, infants who were shown the mobile move after a baseline period, but without having to move their head to the nonpreferred side, would not later respond to the mobile as a reinforcer by changing their position preference. Thus, an infant must learn that a particular consequence is produced by a particular movement before that infant will learn that making that movement will increase the number of reinforcing consequences. This may not be a permanent condition, in that the infant may learn to make the mobile move after periods of time longer than the ones used by Watson. We will return to this point a little later.

Some other studies reviewed by Butterfield and Cairnes a few years ago (1976) are of additional interest in this area. In their work (along with Gary Siperstein) they had demonstrated that infants would suck on a pacifier with greater intensity to hear vocal music than they would to hear the same music without the singing. Other studies showed that an infant would suck either harder or faster or both to hear a simple "baa" sound delivered again and again on a tape recorder. However, after awhile the infants would slow their sucking rate and intensity back to the baseline level as a consequence of boredom or satiation or habituation (the latter terms being a bit more "objective") but would immediately increase rate or intensity of sucking if even so small a change as hearing a "paa" rather than a "baa" was made in the taped presentation. Further, other investigators have found that infants will suck harder or faster to hear the language pattern of their mother than to hear the pattern of a different language such as Japanese. The reason that these studies are of particular interest is that they were done with

newborn infants who were not more than four days of age! In each of these examples, the infant already knew how to suck a pacifier and had a normal rate or intensity for doing so, but would also suck either harder or faster or both in order to experience vocal music, a simple speech sound, or the voice pattern of the language spoken by its mother. Such consequences obviously motivated the infants to behave differently, although very few of us would have said that a newborn has a need to hear vocal music, or, if deprived of hearing "baa" sounds, would work harder to hear them. Food and drink we know about, but we are just starting to learn about other factors that motivate an infant to increase the rate or intensity of a given form of behavior.

This reaction on the part of the infant is not restricted to just the sounds that an infant hears. Would you believe that an infant will increase rate of sucking just to continue watching the design that anyone can find on a simple checker board? Infants a bit older will work to see a face rather than a random assortment of a mouth, nose, ears, and eyes. By several months of age, an infant will suck harder to see a face of its own mother rather than the face of a stranger. As before, the average parent does not think of needs or motivation when it comes to events such as seeing faces, but at the same time, almost everyone recognizes that some types make even very young infants laugh, although they would not conclude from that information that the infant would work by sucking harder in order to actually produce events that make the infant laugh. This is an important distinction when working with the handicapped child because often we will find activities or events that produce no smile or signs of recognition but for which behavior will increase.

The point that we are trying to make here is that, while some conditions of motivation can be determined by attempting to understand the wants, needs, or other deprivation states that the child may have, a tremendously large number of motivating conditions or events will remain undetected using such an approach. Instead, we would strongly suggest that motivation of a severely handicapped child be detected and understood in terms of the conditions or events for which the student is willing to change the rate or intensity of his/her behavior in order to produce or avoid them. This is what we mean by operationalizing motivating conditions. Whatever consequence that works in changing the rate or intensity of a student's behavior must be viewed as a motivating condition. The remainder of this manual is devoted to methods for detecting and then using the wide range of events that can be used to motivate the behavior and thus increase the learning process of the infant or child.

Types of Motivating Conditions

In the information above, we discussed two basic types of motivation in a very brief way. One type is the set of conditions or events that a person will work to produce. We will work by moving a spoon into a mound of ice cream, set a relatively small amount of it on the end of the spoon, lift the

spoon from the dish to our mouth, open our mouth, put the spoon in, close our lips, lift the handle of the spoon slightly upwards against our upper lip, and then slide the spoon out of our mouth and prepare for the next cycle of movements as we melt and swallow the good tasting stuff in our mouths. In this example, there are at least eight major steps of work involved in getting a small amount of ice cream into our mouths. There are two ways of saying this in all examples of positive motivation. One way is to say that a person will work to produce something that s/he wants. A somewhat more objective way of saying it is if the person will work to get something, then s/he wants it. When we are working with the handicapped student, we will generally find that the second way of describing the positive motivation of our students is more useful.

The second type of motivation is a bit less obvious and involves those conditions or events that a person will work to avoid. For example, the average parent will work very very hard to do whatever is necessary to make their infant stop crying. They will cover the baby, change a diaper, check for an open safety pin (how about a piece of diaper tape sticking to the skin?), feed the baby, give him/her four ounces of orange juice, talk to the baby, make funny sounds and silly faces, rock the baby, bounce the baby, cuddle the baby, and, in general, turn themselves inside out to get the kid to shut up. Put a clean towel over the head and eyes of an infant or child and s/he will move to several other examples of both positive and negative types of motivating conditions so that we will have an operational definition of them.

IDENTIFYING POTENTIAL MOTIVATORS

When we are looking for something for which the handicapped student will produce behavior in order to get, we have to first decide what types of "work" (or behavior) we might use. In this effort, we start by observing the student a bit -- watching what the student does at various times and under various conditions. Does s/he look at things? Does s/he seem to look at some things more than at others? Does s/he move his/her body around in order to see something from a better point of view, such as moving to see something just under the desk (or table or tray)? We can immediately decide that the behavior of looking and moving the body in order to see are the types of work and, if the student does this, then we have a basis for finding some forms of positive motivating conditions. Our problem is to set the task so that we are, in effect, asking the student a nonverbal question.

Let us assume that our student has been seen looking at pictures hanging on the wall, and that it is reasonable to assume that pictures attract that student's attention. We can then start with colored pictures of people, animals, vehicles, types of outdoor scenes, forms of recreation such as swimming, jumping rope, sledding, etc., until we have a reasonable number of different pictures. We can then present these pictures in pairs in order to determine which member of any given pair seems to attract the student's

attention most. Before presenting the pictures, a set sequence should be established (see example in Table I). If the student selects pictures with a definite preference, then the procedure will terminate with a ranked sequence of what pictures the student selects most frequently. Objects or actions that are represented by the respective pictures will also give us some major clues about what real objects or actions the student might like. This sequence is simply an example of a method of working with handicapped children that we prefer to call the "strong inference model" which was initially described by John Platt in 1964. Let us assume that, in the sequence of pictures, the student had a decided tendency to pick pictures of known people. His/her parents, brothers or sisters, teacher, teacher aide, minister, priest, or rabbi, or even a schoolmate might have been chosen when paired with any other alternative. We might infer from this a very strong social reinforcement structure such that contacts with or even pictures of these people could motivate relevant behavioral improvement and even important aspects of learning. We could use pictures as reinforcers by starting an album with the student which s/he could fill as a consequence of doing something of significance in the classroom or at home. This is not to say that every, or even any, handicapped student might prefer pictures of people, but if they do, we would be able to find this fact using the method described in the sequence and then use this information to motivate some other interesting forms of behavior.

A similar approach that is a bit more complex is to pair objects and present them two at a time, allowing the student to take one of the two and play with it for a while. In general, and especially in the early stages of learning and instruction, one can expect young handicapped students to do very little with objects and what they will probably do is considered rather primitive in behavior development. The typical student will pick an object, bring it to his/her mouth, suck or bite it for a couple of minutes, bang it on the table, rub it on the table surface, flip it repetitively, and generally conclude by dropping it. Such actions are the schemes or operants that represent the current organization of the child's behavior. The idea of pairing items, letting the student choose one of the two, and then observing what the student does with the selected object is the basis for identifying not only items that are potential reinforcers, but also a means for determining the behavior that may be the starting point of an instructional path. As the child proceeds to select various items and use them either repetitively in one way or each in different ways, we can then systematically arrange the items across a large number of trials to determine the pattern and function of the selection. In this arrangement system, we are attempting to isolate the strong tendencies of the child in terms of both preference and of use. The following example was taken from our recent interaction with a severely handicapped student in a classroom in which he was enrolled for the first time -- at age 14, he had never been in a school classroom before this.

Table 1
RECEPTIVE LANGUAGE - TWO-CHOICE TASK

Name: _____ Date: _____

Staff: _____

Antecedents: _____

Consequences: _____

Individual
Considerations: _____

	L	R	+/-		L	R	+/-
1.	Shoe*	Toothpaste	_____	21.	Shoe*	Toothpaste	_____
2.	Hairbrush	Cup*	_____	22.	Hairbrush	Cup*	_____
3.	Comb*	Spoon	_____	23.	Comb*	Spoon	_____
4.	Toothbrush*	Soap	_____	24.	Toothbrush*	Soap	_____
5.	Watch*	Sock	_____	25.	Watch*	Sock	_____
6.	Cup	Shoe*	_____	26.	Cup	Shoe*	_____
7.	Toothpaste	Hairbrush	_____	27.	Toothpaste*	Hairbrush	_____
8.	Sock	Comb*	_____	28.	Sock	Comb*	_____
9.	Spoon*	Toothbrush	_____	29.	Spoon*	Toothbrush	_____
10.	Soap	Hairbrush*	_____	30.	Soap	Hairbrush*	_____
11.	Comb	Watch*	_____	31.	Comb	Watch*	_____
12.	Sock*	Shoe	_____	32.	Sock*	Shoe	_____
13.	Cup*	Comb	_____	33.	Cup*	Comb	_____
14.	Toothbrush	Toothpaste*	_____	34.	Toothbrush	Toothpaste*	_____
15.	Spoon	Soap*	_____	35.	Spoon	Soap*	_____
16.	Hairbrush*	Cup	_____	36.	Hairbrush*	Cup	_____
17.	Shoe	Sock*	_____	37.	Shoe	Sock*	_____
18.	Soap*	Watch	_____	38.	Soap*	Watch	_____
19.	Toothpaste	Toothbrush*	_____	39.	Toothpaste	Toothbrush*	_____
20.	Watch	Spoon*	_____	40.	Watch	Spoon*	_____

Strategies To Identify Potential Reinforcers

We started with the knowledge that each situation presented to Bobby would be a multiple stimulus condition and that we could not tell in advance how he would react to each of these conditions. Since he was rarely heard to vocalize and never heard to emit a sound that was anything like a word, we assumed that he was without expressive language. In addition, he never indicated even the possibility of receptive language. The conditions of the task that we considered important were:

1. Position of objects left or right.
2. Texture of objects.
3. Color of objects.
4. Objects capable of noise or music.
5. Objects capable of manipulation such as friction or wind-up toys.
6. Objects associated with self-help like a comb, brush, small towel, toothbrush, etc.
7. Wearable items such as a hat, gloves, necklace, bracelet, etc.
8. Static objects or toys such as beads, small puzzles, dolls, stuffed animals (always include a soft green frog).
9. Edibles such as fruit loops, raisins, marshmallows, M&M's, granola (for health food nuts), etc.
10. Drinkable fluids ranging from water to coke and including milk.
11. Tools including spoons, a dull pencil on a small sheet of paper, crayon, a small ball of yarn, a cup, small hammer, small shovel, etc.
12. Any other items that prior observations of the child indicated might have value to test in this situation.

Since Bobby was seated in a wheelchair with a large tray attached, we positioned ourselves across from him with the various objects on a table at our side. The objects were then selected at random in pairs and then presented to him about twelve inches apart while we held his nonpreferred hand (see Table II and Figure 1). This made it possible to only take one of the two objects and, as soon as he touched one, the other was placed back on the table. A second person wrote the positions and description of the two objects and then made notes on what Bobby did with the selected object for about 30 seconds after he selected it. The objects were then represented on two or three more trials to determine if he was selecting the object on the basis of position and if his selection was consistent. We then changed the objects in a systematic manner to determine if he was selecting objects on the basis of such factors as color, texture, manipulability, edibility, drinkability, sound making capability, or simply selecting the objects at random and chewing, pounding, rubbing, or simply throwing them at the teacher. Bobby was tremendously consistent (which is quite unusual with such children) in that he always selected objects in the direction of their being

Figure #1

Preferred/Non-Preferred
2 Choice Discrimination Assessment

Items Used: _____

Required Response: _____

Antecedent Conditions

Arrange item order so that no item is presented more than 2 consecutive times and all appear equally on right and left sides.

↓

Position student so that tone is noramlized and expected motor response is facilitated.

↓

A Trainer presents 2 objects, gives no verbal directions, starts stop watch, waits for student to select object through required motor response.

Does student select object before 30 seconds? → no → Trainer removes objects. Places next pair (Recycle to A)

↓ yes

Trainer socially interacts with student with verbal comments such as "you got the train" but does not guide student interaction with toy.

↓

Has student stopped interaction with toy? → no → Remove objects after 1 minute of intearction; present next pair (Recycle to A)

↓ yes

Trainer marks data sheet: Item selected, hand(s) used, time to selection (latency), length of interaction, comments on interaction

↓

Is this the 10th presentation? → no → Recycle to 10 Presentations

↓ yes

Is this the third session? → no → Repeat sequence at another time

↓ yes

Terminate Program

Table 2

CONSEQUENCE PREFERENCE

EXPLORATORY TWO CHOICE DISCRIMINATION TASK

Child's Name:_____Time Start___Time End_____

Trainer:_____Date:_____

Description of Task:

Antecedent Arrangements:_____

Required Response:_____

Consequence Conditions:_____

	Left	Right	Response Latency	Contact Time/Hand	Comments
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
Totals					

# of choices Right Side_____

# of choices Left Side _____

Comments:

Selection Frequency: Object #1_____

Object #2_____

Object #3_____

Object #4_____

Object #5_____

manipulable by shaking them gently up and down. The best member of this group was a string of plastic pop beads. Five beads on a string proved to be ideal in terms of Bobby's pattern of selection. Through this method we isolated a very powerful potential reinforcer for Bobby (shakeable objects such as pop beads) and identified his strongest form of behavioral manipulation (shaking).

A more typical pattern of behavior was given by Jill, with whom we tried essentially the same procedure. At first glance, Jill was very much like Bobby in that she was nonverbal, about the same age, had never been in a school program, was nonambulatory, had reasonably good manual manipulation ability, and showed social responses such as smiling at people. When the objects were presented to her, she would seldom select one of the two objects in the minute allowed for her to do so. On occasion, she would select a medium-sized rubber ball or a doll and then proceed to simply cuddle it to her chest. However, she was unreliable in selecting these objects and would not work hard to get them. She would never take candy, fluids, or other toys, even though she could. These sessions were repeated several times each week for more than six weeks with about the same results. Jill could be described as simply not caring very much about anything that we put into her sequential "smorgasbord" of items. Thus, we were unable to find items that could be called potential reinforcers and we had to approach Jill differently from Bobby. Social deprivation was used to set up a mild aversive condition (no social interaction/ignoring), which was terminated and replaced with interaction when Jill performed desired responses. (Specific procedures are described in a later section.)

We should mention Katy, who was known to us long before we tried this procedure as someone who would eat literally anything and everything. Give her a piece of candy with the paper still on it and she would eat paper and all. Give her string, a sock, a spoon, and she would inevitably put it in her mouth and attempt to eat it. Our problem with Katy was not in having her select items, but in presenting only items that she could not put in her mouth and swallow easily with the exception of allowable edible items. Even plastic cups with small amounts of milk couldn't be used because she would bite pieces out of the edge of the cup as soon as she brought it her mouth -- we didn't know this until after she did it the first time she had the opportunity -- but we didn't make this mistake twice! Needless to say, we found her to be exceptionally reliable across trials and we had identified a large set of powerful potential reinforcers -- all of them edibles.

Motivating Severely Handicapped Students

These three students are real people who are all in early adolescence. There is not really much wrong with them in terms of motor problems, although Jill had a modifiable deformity in her feet which was altered with orthopedic surgery. Unfortunately, each is nonambulatory and clearly evidences a problem that Seligman (1975) has termed "learned helplessness". For Bobby, the objects that he was allowed to use were not very functional for

manipulation or for contingent feedback (such as a music-making toy or wind-up toys). Consequently, he has taken the items provided, such as plastic toys, and habituated a specific stereotyped form of "flipping" in which he will engage for literally hours on end. While we are able to use this form of behavior as a means for motivating behavioral change, it came into existence as a function of having never been taught something better to do with his "free time". Jill reacted to the same set of past circumstances by simply not responding to much of anything. She has accustomed herself to watching the world go by and having everything that needs to be done for her performed by someone else. Her feeding, washing, dressing, and even her sole entertainment (television) are done by someone else as she passively responds to those requirements which only she can perform, such as opening her mouth, swallowing, or slowly pushing herself around her small world looking for something better to watch. Katy solved the same set of problems by focusing all activity on eating, which is, at present, her only interest. At most other times, she will simply sit with her right hand deep in her mouth and flicking her big toe with her left hand. In later sections, we describe how we pushed the students out of these stereotyped forms of behavior into events that were more progressive, but we want to mention that these students were not behaving as they do (did) because they were severely or profoundly handicapped, but because they learned this behavior to compensate for the lack of something better to do.

Of the three students described above, only Jill presents a major problem of motivation. Her lack of responsiveness is momentarily difficult to manage as a severely impaired student who cannot control her movements as a function of cerebral damage. To change this state of affairs, we may have to turn to consequences which are termed mildly aversive and which the student will work to avoid. This is a very sensitive issue for at least a couple of major reasons. First, many people believe that severely and profoundly handicapped children are in this condition because of inability to learn, regardless of the instructional strategy used to improve their behavior. Some may recall Pearl Buck's (1950) description of her handicapped daughter who, while trying to learn a reasonably complex task, began to cry from frustration and inability to manage the task. Pearl Buck responded to this situation by removing pressure from her daughter and decided to do whatever she could to have her child enjoy life without such problems. Subsequently, the daughter was institutionalized in order to be in an undemanding environment. The real problem is that Pearl Buck wrote a very popular book about her daughter and many have used the account to justify a school program that concentrates on providing the full range of reinforcing events without asking the child to do anything to produce them. This is the task in sensory stimulation -- passive behavior. We describe this situation as one of making the child as happy as possible, given his/her disability. This happened to Jill and, as a consequence, she may remain institutionalized for the remainder of her life with no options available to her. She will eat when someone decides to feed her, sleep when someone puts her to bed, and be free to slowly explore her environment when someone has the time to place her in a walker. Such events may actually make Jill happy, but in the absence of any options, who can tell for sure?

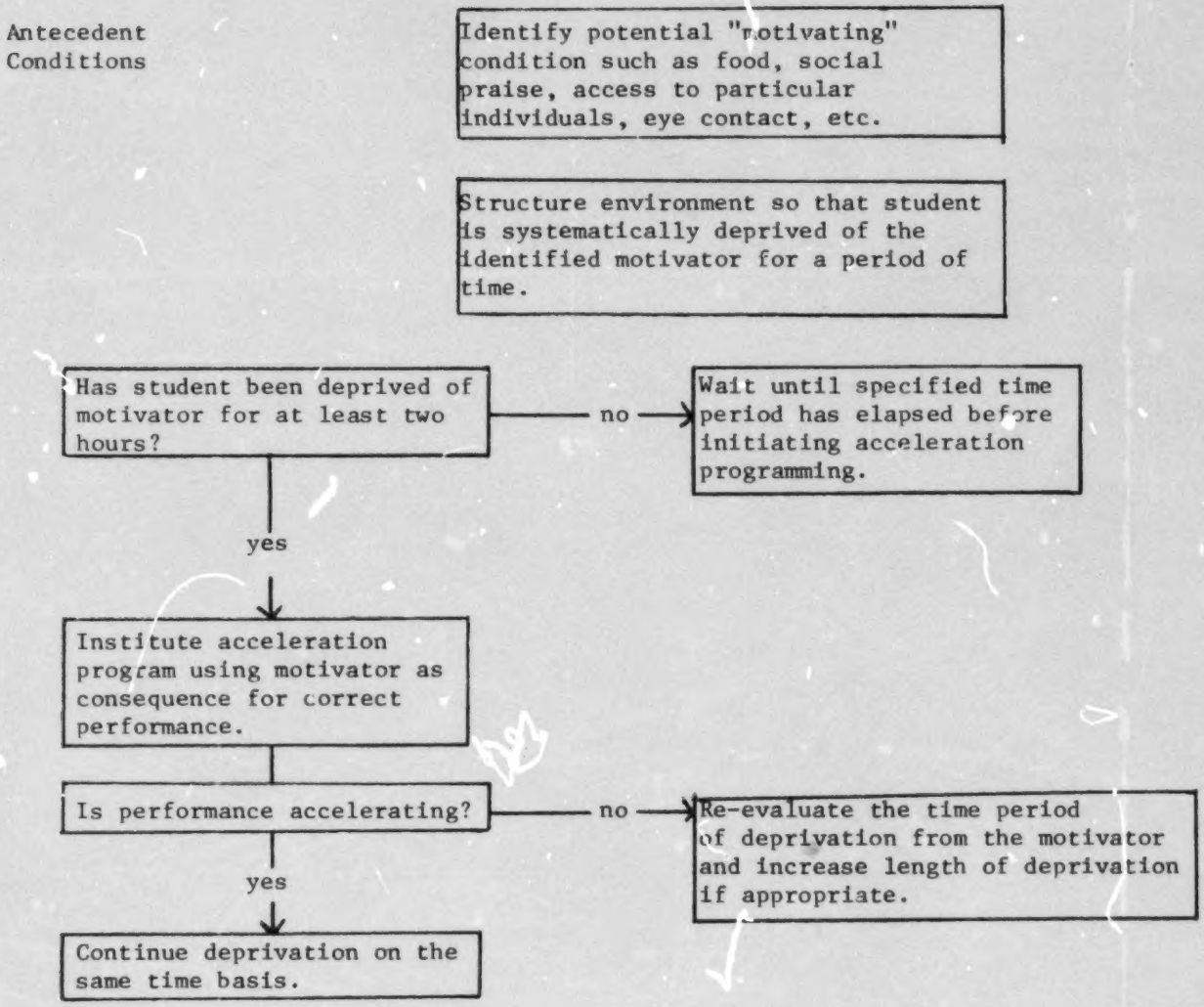
Our alternative was to attempt to increase existing motivational states with students like Jill by setting up mildly depriving conditions (Figure 2). For example, Jill generally eats three full meals each day, but tends to resist food when used in a behavior demanding situation. One means to improve motivation is to reduce the breakfast to something like juice and then use other parts of breakfast after 10:00 a.m. to reinforce selected performances. The same pattern could then be used with lunch so that mild food deprivation could form the basis of the desired performances. Another form of mild aversive stimulation for Jill (and for many other students as well) is short term social deprivation. Jill likes to have people with her and to be doing entertaining things for her like talking to her, showing her pictures, making objects such as toys or record players operate properly. The problem arises when she is asked to perform even the simplest part of any of these tasks like turning the page of a book, pulling the string on a toy that makes noises like farm animals, or pulling a doll to her which was placed on a towel in front of her. In social deprivation, the person working with her was directed to set the task so that Jill could perform it and to then sit staring at the task and not talking to Jill at any time. However, if she made a definite move to manipulate the arranged materials, the person would praise Jill, give her a hug, rub her back, and do other things that Jill enjoys (not all at one time, but distributed across instances of performance by Jill). In this way, the situation remained socially deprived as long as Jill waited for teacher activity, but became alive and animated when Jill made a desired response. The initial waits in this situation sometimes were as long as 20 minutes, but then reduced quickly across opportunities. We will discuss other types of mild aversive consequences later.

IS-DOES LANGUAGE OF REINFORCEMENT

In the above section, we discussed two major types of motivation. The best type to use in educational intervention with handicapped children is motivation derived from letting the child have something s/he wants as a function of doing something that we want. This can be called positive reinforcement because the child must want, like, reach for, work for, or otherwise turn themselves inside out to get this type of consequence. What consequences serve in this way with most handicapped students is a remarkably individual matter. We have met children who will try harder to get the teacher to blow gently in their faces than for M&M's or other edibles, and we used blowing as a positive reinforcement in some aspects of training. Another child loved fruit loops, but would only eat them from a spoon - she wouldn't pick them up from the table, take them from the teacher's hand, or even from the box, but only from a spoon. So she received fruit loops from a spoon as a motivating reinforcer. Yet another student worked for parts of a plastic toy tool box and for practically nothing else. We attempted to give a fruit loop to one youngster who immediately broke it and then blew it on the floor and laughed. He did the same with a second and then a third loop and laughed each time. He then waited expectantly for the next one which we gave to him after we got him to approximate a verbal imitation of

Figure #2

Deprivation Procedures


Antecedent Conditions
Identify potential "motivating" condition such as food, social praise, access to particular individuals, eye contact, etc.
Structure environment so that student is systematically deprived of the identified motivator for a period of time.
Has student been deprived of motivator for at least two hours?
no
Wait until specified time period has elapsed before initiating acceleration programming.
yes
Institute acceleration program using motivator as consequence for correct performance.
Is performance accelerating?
no
Re-evaluate the time period of deprivation from the motivator and increase length of deprivation if appropriate.
yes
Continue deprivation on the same time basis.

"Want loop!" He was reinforced by fruit loops, but only because he would smash each cereal and blow the pieces on the floor. To us, the effort of cleaning the resulting mess was well worth the greatly improved motivation of this student which may be something akin to saying that we "laughed all the way to the bank."

Almost anything can be a reinforcer to a given child and some of our most reliable consequences such as ice cream, coke, and M&M's are not reinforcing to all students. The point that is important here is that a consequence is reinforcing to a given child when and only when it has the desired effect of improving the child's motivation to learn or to continue to respond correctly. If we consistently praise the child and yet there is no observable change in behavior or motivaton, then our praise is not a reinforcing consequence. If shouting at a child to keep his/her hand out of his/her mouth is associated with either an increase in hand-in-mouth responding or at least no decrease in this form of behavior, then shouting is reinforcing, even if it was meant to decrease such behavior. A consequence IS what a consequence DOES to a child's motivation.

Since reinforcing consequences vary widely among children, a method for finding effective consequences that is more efficient than simple "trial and error" is the use of the Premack Principle. David Premack (1962) studied issues of reinforcement first with animals and, more recently, with children and made some truly interesting observations. First, the fact of reinforcement is not so much the consequence itself, but what the individual does with it. M&M candies are not reinforcing as such, eating them or trading them for something better to eat (like granola bars?) is the key to reinforcement. Drinking coke and not the coke itself is the reinforcing event. Playing with the tool box and not the tool box itself is the reinforcer. Smashing the fruit loop and not the loop itself is the reinforcer. "Flipping" the pop beads and not the beads themselves is the reinforcer. In effect, behavior is the reinforcer for previous behavior. If this is the case, how does one determine what is reinforcing and what is not? Premack stated that the observed probability of behavior determines the reinforcing value in any given situation. If a handicapped child is observed to spontaneously have her/his hand in his/her mouth and be sucking on it for periods of about four hours out of each 16-hour waking day, then we can say that hand in mouth has a probability of about .25 or will occur about 25 percent of the time. If the same child has the opportunity to play with some toys placed in front of him/her, but is observed to do so only about one-half hour out of a 16-hour waking day, then his/her probability for spontaneous play with toys is only .03 or three percent of the time. In this example, we can conclude that sucking his/her hand is more reinforcing than playing with toys. Premack's principle can then be taken to the next level that specifies that the probability of any behavior can be changed by following the occurrence of that behavior with a consequence that allows the student to engage in a more probable behavior. With the hand-in-mouth child, we can accomplish this change by restricting the hand by tying it gently, but firmly, to the arm of the chair, using a weighted wrist cuff, or simply holding the hand on the table. At the same time, the student is given the opportunity to play with some selected toys with the other hand and when play occurs for ten minutes or so, the student is then allowed to have access to

his/her hand again for a few minutes. In this way, we have taken a low probability behavior (play) and set it up to be followed by the consequence of being allowed to engage in a high-probability behavior (hand sucking) which is the basis for reinforcement. If this is done consistently, the amount of time spent playing with toys should increase at least up to the probability level of sucking the hand. Any behavior can be reinforced by following instances of that behavior with events or objects that allow for the occurrence of behavior that has a higher probability.

If a student tends to spend about three hours a day eating and drinking, then we can assume that such behavior has a probability of .19 (3 divided by 16 hours, which is about the average waking day). If we restrict eating and drinking for a period of time by not allowing the student to eat most of his/her breakfast, we have restricted the probability of the behavior and have thereby set up a potential reinforcer. If the child will imitate one motor movement in a half hour, then we know the probability of imitation is about .03 (1 divided by 32 half hour segments in 16 hours) so that imitation is far less probable than eating. Consequently, if we allow the child to spend a few moments eating after every successful instance of imitation, we are arranging the occurrence of a high probability behavior to follow the occurrence of a low-probability behavior, which is Premack's definition of a reinforcing state of affairs. In this way, the rate or probability of imitation should begin to increase.

A teacher or therapist does not have to know the exact proportion of time a student engages in a given form of behavior to determine the basic reinforcement of the child since simple observed instances of frequent forms of behavior can generally be judged to be probable reinforcers. However, the condition that a wide range of potential activities are provided must be met before such observations have much utility. Afor example, our friend Bobby, who we described earlier, would spend great amounts of time flipping pop beads, but he had never had access to a drum. Therefore, we really don't know if a drum might have a higher probability for occupying his time or not. One way to deal with this situation is to provide handicapped students with a cafeteria of items to eat or manipulate and watch what they do with them (Figure 3). In a restricted sense, this is what we suggested in the two-choice activity described earlier by which we determined that Bobby liked the pop beads more than the other objects offered to him. A wider ranging cluster of items may give us even greater insights into the set of conditions that will motivate a handicapped student. In addition, the cafeteria concept gives each student greater latitude in using the available items than the situation found in the two-choice system. This is especially important in terms of the amount of time allowed for a student to explore an item. Therefore, establishing a prolonged interaction with items allows for student exploration and discovery of some functions that could "be of interest" to the student and also be useful as a reinforcer at some other time. Such opportunities in a cafeteria structure may also allow the student time and intrinsic motivation enough to demonstrate complex forms of behavior, which would not be observable under restricted conditions. This is an important outcome in that what we see in the behavior of handicapped students is often constrained by the restrictions we place on the environments in which they are free to behave.

Figure #3

5-Choice "Cafeteria"
Assessment of Object Interaction

Items to be used: _____

_____

Required Motor Response: _____

_____

Program Steps:

1) Trainer selects 5 objects to be placed in front of student.

2) Trainer positions student in such a way as to facilitate object interaction using required motor response.

3) Trainer places 5 objects equally spaced in front of student (2 on right side/2 on left/1 center).

4) Trainer records behavior on 10 second intervals for total period of 5 minutes. One mark is made at the end of each interval in appropriate category when student is engaging in required motor response. Other and No Response columns are marked as indicated on data sheet.

5) At least three sessions with the same objects presented in different positions are run before data is interpreted.

In all of this, we have said very little about the use of aversive conditions in motivating children. The reason is simple. Punishment works! When a child does something that we do not like, and we decide to use punishment such as spanking the child, putting the child into immediate isolation, withdrawing positive reinforcers instantly upon the occurrence of an undesirable form of behavior, we can see some rather dramatic rapid results. The problem is that while punishment works to eliminate undesirable behavior, it does relatively little to teach the child an alternative mode of response. While mild aversive stimulation which the child can avoid by performing in a more appropriate manner is much more acceptable than the simple use of punishment, neither approach is the "treatment of choice" when positive reinforcement strategies have not been fully tested. We should be willing to use our best shaping techniques with positive reinforcement before trying aversive processes in any situation with the more severely handicapped.

ANTECEDENT EVENTS IN INSTRUCTION

As much as we have said about the importance of consequences in the motivation of behavior change, one could conclude that all that is needed in instruction is an effective set of reinforcers. This is true when the child knows how to emit the desired forms of behavior and only a change in motivation will be necessary to induce the child to demonstrate his repertoire. In the early stages of instruction, motivation is very important for this exact reason; without it we cannot tell the difference between a child who knows what to do and simply isn't motivated to do that from one who doesn't know what to do. However, once we are assured that we have a motivated student and we have convinced ourselves that the problem is one of having not learned the appropriate form of behavior, then we must turn to antecedent conditions to find the appropriate sequence to teach new behavior to the student. The rule that applies here is that antecedent conditions determine new forms of behavior and consequences strengthen the rate or probability of that behavior. In the selection and arrangement of antecedent events, we find the secret of successful instruction with handicapped students.

Bringing the discussion down to concrete realities, a few examples would serve us well to illustrate these points. Suppose that we want a student to be able to "name" a set of common objects. Objects could be "named" by speaking, by signing, or by pointing to/looking at an object or symbol. Several factors are important in determining how we proceed with this task. First of all, from the knowledge of sensorimotor or cognitive development, we would determine a prerequisite that the student must be interacting with objects and with people at a level of development consistent with secondary circular reactions. At this level, the student would be making discriminations among objects. This would be determined through observation that s/he behaved differently with respect to several types of objects, "drive" a toy car, wear a necklace, put a hat on the head, pretend to drink

from a cup, rock a doll, etc. A student who showed primary circular reaction behavior would pound, mouth, rub, or throw the objects without much evidence of differentiation among them. In addition, the child who is differentiating discriminating objects would also probably differentiate people in that some would be preferred over others and a particular few would instill extreme excitement in the student. These cognitive and social indicators are reasonable prerequisites to the more complex act of object naming. However, we cannot simply ask a relatively mute child to begin naming objects since there is probably no evidence in his/her repertoire that he/she has the names available to assign to the selected objects. For this purpose, we would turn to verbal imitation training as the first in the sequence of steps. If this failed, we might then turn to motor imitation training. Both verbal and motor imitation training strategies are outlined elsewhere (Bricker & Bricker, 1976; Bricker, Ruder, Vincent-Smith, & Bricker, 1976; Guess, Sailor, & Baer, 1978) and are used only as examples of different types of antecedent arrangements. The point is that characteristics of the student's response structure would indicate the level at which training would be tried and that failures at one level would immediately push training back to another prerequisite level. However, in either level of imitation training the same basic structure of antecedents would be used.

Assuming motor imitation, the first step in antecedent arrangements would be the selection of a specific motor movement that is to be imitated (or a group of about five such items). The next step is to present the movement(s) along with the request, "Do this". If the child does not begin to imitate in a span of about two or three seconds, then a second example of the movement, along with the request, would be made. (See Figure 4.) If again there is no response, then a second movement would be tried and the evaluation cycle repeated. Generally, five or six assessments of this type using somewhat different imitation movements in each assessment would be sufficient to establish the initial assumption that the student was not imitating, imitating only approximations of the modeled movement, or was actually imitating the selected responses. However, the assumption would be predicated on the condition that the student was motivated to respond imitatively through the use of known and proven reinforcers. If the student is only approximating imitations, or is not imitating, then the procedure is shifted to a training routine through the mechanism of altered antecedent arrangements. Alterations in antecedent conditions follow a relatively standard pattern which is based on a very useful notion of multiple stimulus control.

Multiple Stimulus Control:

One of the misconceptions about behaviorism that many people hold is that the structure of human behavior must be represented in a network of simple stimulus-response-consequence models. This structure is called the "three-term contingency of reinforcement" and is indeed used often in the context of behavior modification. However, the situation is much more complex than that, as we will see. First, no training or testing ever goes

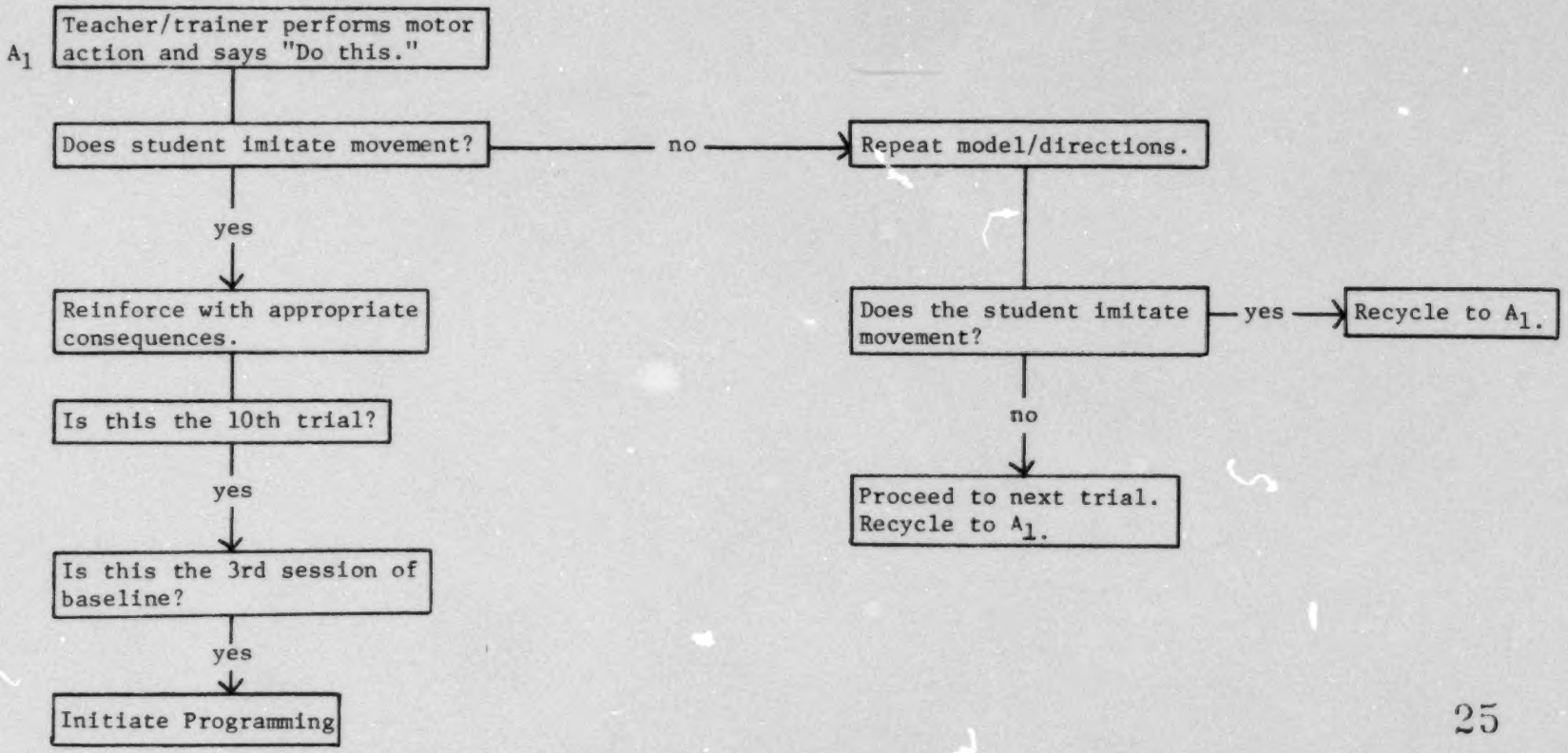
Figure #4

Procedures for Motor Imitation Baseline

Antecedent Conditions

Select at least 5 motor acts to be imitated by the student. Motor actions should be in the repertoire of the student and representative of: Motor actions with an object (beat drum, hit table); visible motor actions (clap hands, touch head); invisible motor actions (blink eyes, stick out tongue).

Construct data sheet where each item is presented at least twice (5 items, 2 times each, total of 10 trials).



on in a situation where a single stimulus or consequence can be identified as the one and only critical element. The student comes to the situation of training in some complex state of deprivation in that some time has elapsed since the last meal; the preceding encounter with school or home was either boring or exciting or neutral, each of which has its own residual deprivation; the history of training in this setting has differentially prepared the student to emit the desired correct responses; and the training room itself is a complex network of physical and social stimuli, which each may or may not have some control over the behavior of the student. For example, pictures of sport or TV stars on the wall might attract looking, as could the presence of interesting toys or magazines. A friendly teacher and other students would add to the complexity of the situation, and each stimulus element has the potential to operate as either an antecedent or consequent event. The behavior of the student from moment to moment would represent a resultant of these stimulus conditions in interaction with the immediate and long-term historical events that have shaped the behavior of the student to respond as he/she is observed to do. In this complexity we bring a couple of relatively weak stimuli, including the statement, "Do this!" and a modeled motor movement, and hope that the student will respond so that we can say, "Good boy/girl!" To believe that a handicapped student will snap to attention and rapidly emit the correct response under such diverse conditions is akin to believing in magic.

Physical Guidance

In considering multiple stimulus control in a training situation, the essential factor is the means by which antecedents can become salient, which operationally means how the child can come under control of the selected ones. For many forms of behavior this is done through the process of physical guidance, which means guiding the student through the required movement exactly as you would have the student do it by himself/herself. In imitation training this is done by using a second trainer (a parent, a volunteer, a classroom aide, whoever) who would stand behind the child holding the hands and head in something like a "neutral position". When the child stopped fussing and looked directly at the teacher, the teacher would say "Do this!" and perform a selected motor movement. This time the assistant would move the child's hands, arms, or whatever to duplicate the movement and the final placement. The assistant would also sensitively determine the point at which the student was contributing some part of the movement such as, at least in the beginning, by not resisting having his/her hands or arms in the presented position. When this occurred, the assistant would quietly nod to the teacher, who would quickly praise and reinforce the student. The reinforcer selected would be one of the most preferred by the student so that it was attention-getting as possible. The rule is to use the most powerful reinforcer at the early stage of important training activities so that the probability of the response would have the greatest possible likelihood of increasing. This cycle would then be repeated several times in a given training session and across days. On each successive cycle, the attempt is made to give less and less physical guidance until the student emits the full response all by himself or herself. While the first such

imitated movement might take two or three sessions, each successive movement should take less time until the student imitates a new movement without assistance or training. This is an enviable state called "generalized imitation", which can then be used to quickly teach a wide variety of functional skills to the child. The point here is that in establishing stimulus control, one condition can be made quite salient by making it impossible for the student to do other than the desired response.

The use of physical guidance is the most important form of stimulus control for this reason. As the response is repeated and degree of physical guidance is faded, then the control over the response is shifted to other stimuli in the training situation. In the last analysis, the control is held exclusively by the preselected antecedent stimuli of, "Do this!" in conjunction with the selected modeled movement. In generalized imitation, the training has proceeded to the point where components in the movements have been established as controlling stimuli such that new combinations of movements can now occur in newly presented items.

Another example of multiple stimulus control can be found in the domain of discrimination. Again, selecting an example from language training, we can find a different form of multiple stimulus control in receptive language training. The basic situation would begin with a single object with the request, "Give me the _____ (name of the object)!", coinciding probably with the teacher extending his/her hand, palm up. If, after three or four tries, the student did not respond to the request, we could again use physical guidance of the response and then a strong reinforcement when the object was placed in the hand (remembering to reinforce immediately upon the release of the object). This cycle is repeated until the student picks up the object upon request and, without assistance, moves it to, and places it in the hand of the teacher. A check on the system is made by the hand and not making the verbal request and, if the student makes the response anyhow, then you know that the hand alone constitutes a controlling stimulus for the movement, which is not a desirable outcome. In this case, training must include a series of extinction trials, during which the object is simply replaced on the table and the hand extended again (after a few second time out) and left in position for about five seconds. If, after a few such trials, the student can inhibit the response for five seconds, then the verbal request is repeated, "Give me the _____!" Once the student is under this degree of stimulus control, a second object can be brought in to provide a distractor. In a two-choice situation involving only two repeated objects (or pictures), one form of stimulus control that the teacher needs to watch for is position selection, since a student who picks up an object from either the left or the right, is reinforced for selecting a stimulus in that position, as well as for selecting that particular object. This is checked by varying the named object from left to right on a random schedule that places it on each side about equally often. If errors persist in the selection of the named object, then some cautions are definitely in order.

A major caution is based on some important research investigations by Terrace (1976) several years ago. The issue is the place of an error in the process of learning. Terrace developed a procedure for errorless learning in which basic stimulus control was established using a strong prompting

procedure and then stimulus control was shifted slowly across sessions so as to prevent error during the entire process. Sidman and Stoddard (1966) replicated this procedure with severely handicapped residents of an institution for retarded people. In their work, they taught a circle elipse discrimination that started with the circle illuminated on one of nine panels with all other panels dark. The students were guided to make the required pushing response to the lighted panel and then guidance was faded when the students pushed the panel on their own. During this phase the location of the one lighted panel was varied from one position to another until the individual readily pushed the panel with the illuminated circle. At this point, the remaining panels were illuminated progressively across trials so that the controlling panel was responded to continuously with very few errors. After a long series, the panels containing the distracting elipse stimuli were as bright as the circle panel, but the students only pushed the circle stimulus, regardless of its location in the set of nine panels. After producing this form of discrimination, they again turned off all but the correct response panel and across trials slowly shifted the form of the circle until it was an elipse, after which they again faded in the distracting stimulus panels (this time containing images of circles) and again demonstrated discrimination without error. Thus, they taught one discrimination then reversed it to the other stimulus and did this all with very few errors. When errors started to become frequent, they modified the program to either change the content of the sequence or the number of steps involved.

The reason for the concern with errors is the extent to which the behavior of handicapped students is controlled, even when they are emitting errors. For example, Vincent did a study with one of the present writers and D. Bricker (1973) in which the errors of preschool developmentally delayed youngsters were analyzed in a two-choice receptive language task. The majority of the errors were made first on the basis of a position preference, next on the basis of an object preference bias that was derived from the fact that the children selected a particular item when it was the nonreinforced and unnamed distractor as often as when it was named, and the final error pattern was object avoidance, in which case the object was never chosen across a sequence of trials. Thus, the errors were not random or chance selections of stimuli, but rather definite choices based on task irrelevant conditions. If this is occurring and the system of assessment is randomly predetermined so that the student could be correct by chance about 50 percent of the time, then we are basically reinforcing the error strategy on a variable ratio schedule of about two responses per reinforcement. This type of schedule is known to maintain responding over a long period of time. Consequently, the teacher could be strengthening a pattern of error responses at least to the extent that the behavior is under the control of irrelevant stimuli and, from the student's naive frame of reference, a confused sequence of antecedent-response-consequence arrangements. This may be the reason that Terrace has indicated that error-based teaching strategies produce emotional behavior on the part of the student.

Prompting

A simple alternative in the discrimination type task is to use some form of prompting such as pointing to the one to be chosen (that is the named object of a pair), or arranging the objects so that the correct one is closer to the student, or illuminating the correct choice. In each of these prompted conditions, we can then fade the prompt across trials as the behavior comes under the control of the relevant properties of the task. Such prompts constitute additional stimuli in a multiple stimulus control situation and are used because they exert greater initial control over selection behavior than does the ultimate relevant stimulus properties. Simple fading of these prompts may be adequate in that when the prompts are no longer given, the child continues to select the correct item across trials. However, we sometimes find that when the last component of a faded prompt is withdrawn, the behavior reverts back to the error pattern used prior to the introduction of the prompt. This would indicate that the prompt alone was the basis for successive choices. An alternative procedure was suggested by Touchette (1971), who used a time delayed prompt in that if the student was observed to be making the correct choice on his/her own, no prompt was given. But if the student did not appear to make a choice or was moving toward an incorrect response, the prompt would be provided. In this way, the prompt was used only when necessary, and the procedure could then be used to determine exactly what point in training when the student came under the control of the task-relevant properties. This is an extremely important principle of training when used with moderately to profoundly handicapped students since it both protects against error responses and can be used to determine when such prompting is no longer necessary.

Stimulus Properties

A factor of multiple stimulus control that is also important is that no property of a stimulus situation is irrelevant in isolation. Position is an important aspect of a task when the student is asked to take the object on the right, on the left, or to alternate from left to right. Texture is an important property when the child is asked to take the object on the right, on the left, or to alternate from left to right. Texture is an important property when the child is asked to take the smooth piece of cloth or the rough piece of sandpaper. Composition is important when the choice is between the "wooden one" and the "plastic one". Size is important when the student is asked to take the "bigger one" or the "smaller one". The same distinctions hold for color, number, array, height, action pattern, relationship, etc. In other words, no stimulus property is irrelevant. It is relevant under certain conditions which are specified by the task or the activity. For this reason, we do not want the students to be under the control of any one dimension for too many items of training nor to emit error patterns by responding to a task-irrelevant dimension to the point where he/she comes to avoid that dimension. Such considerations are not often the focus of instructional technique, although they may be among the most

important in the education of the handicapped. Take a simple example of a piece of chalk. This item might be accurately described as one large, white, long, smooth cylinder weighing two grams composed of calcium carbonate and used for writing on chalkboards. Additionally, it could be the item on the right side of the table under the green box beside the lamp. In this example, there are more than a dozen properties of the situation that could have individual control over the child's responses or they could occur in combinations of an almost limitless variety. While this degree of control is unlikely, it does indicate how we, as teachers, tend to ignore aspects of the stimulus setting that could control the child's behavior. For example, we might ask the child to select the white object and normally expect the child to focus on the color of the object while ignoring size, texture, form, position, etc. If the student already has a rudimentary concept of color, this may not be an unreasonable assumption, but for one who is just being introduced to the concept of color, anything is possible in terms of what particular facet of the situation may be determining his/her response. This type of consideration is a defense of the problem-oriented strong-inference approach to education of the handicapped student. If we can identify the controlling facets of the situation through the use of systematic prompts, we reduce the need to explore each hypothesis of what facet of a situaton is controlling the child's behavior, but even here a series of exploratory attempts would probably have to be made to determine what facets can be used as prompts and how these can then be faded while shifting control to the task-relevant dimensions.

Programming Antecedent Events:

In the discussion of multiple stimulus control, we have attempted to differentiate three classes of antecedent events. The first class is the one that we tended to term "task-relevant". These included the set of facets that would constitute the terminal controlling stimuli in a given instructional domain. For example, in the situation of a child having a number of toys placed in front of him/her and asked to, "Give me the car" would have the toys, the setting, the teacher, and the request as the antecedent events of which the request and the presence of the correct item in the display of toys would be the relevant task stimuli. The selection of the toy car from the array of toys would be the correct response, as long as it included handing it to the teacher. If the student did not perform as requested and this was judged to be more than a momentary lapse in behavior, then we might turn to the second set of antecedent events which we termed prompting stimuli. These include physical guidance of the required response by taking the child's hand, moving it to the toy car, closing the fingers over the object, and then moving the child's hand to the place where the object was to be released. Another prompt would be to point to the desired object or to place it directly in front of the child and away from the other toys. Another antecedent would be to remove some of the other toys or to cover the items except for the car. In each case we have made the correct response mandatory. The third class of antecedent stimuli is the task-irrelevant group which are by far the largest group. A bent stimulus card, a pencil pointing to the correct choice, a look in the direction of the

named object, or any of the number of cues that are considered irrelevant and, therefore, remain uncontrolled in teaching could well be operating as signals to the student as to the nature or location of the correct response. In this way, the student could not only be correct for the wrong reason, but also have a means for being correct that was not detectable or detected for many sessions and would result in important losses of training.

CONCLUSION

There is no set formula for motivating behavior change. The consequences that serve as reinforcers are different for each child and the ones that might cause one child to work enthusiastically might actually be a punisher for another. In fact, we expect that what one student might work to avoid, another might work to get. Only through close contact with the students across a period of several sessions and through the use of some reasonable means for evaluating various reinforcement alternatives will one find the set that works for each of your students. However, the principles of reinforcement are sufficiently important that we are able to state without reservation that the problem with motivation for most handicapped students is the absence of effective reinforcing consequences. Bribery is not at issue here because we are only bribing a child when we use something the child wants to get him/her to engage in illegal or immoral acts. Motivating the child to learn is neither illegal nor immoral, but the failure to motivate so that the child fails to learn implicates a teacher's goals as well as his/her technique.

Once motivated, the problem is the means by which we can teach the child to engage in new forms of behavior and to do so in an increasingly more discriminating way. Physical guidance, various types of prompts, along with the acceptace of successive approximations, will operate to determine new and more effective modes of behavior. Such techniques must also be faded across trials so that the child is volunteering a greater and greater proportion of the terminal performance and is being systematically and emphatically reinforced when he/she does so. Knowing the structure of multiple stimulus control is an important mechanism for determining not only what the child is responding to in any given instructional setting, but also what properties of the setting he/she must attend to in order to derive the greatest degree of generalizability out of training.

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APPENDIX A

CONSEQUENCE PREFERENCE

EXPLORATORY TWO CHOICE DISCRIMINATION TASK

Child's Name:_____ Date:_____

Trainer:_____ Time Start_____ Time End_____

Description of Task:

Antecedent Arrangements:_____

Required Response:_____

Consequence Preference:_____

Trial	Left	Right	Response Latency	Contact Time/Hand	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Totals					

# of choices right side_____

# of choices left side_____

Selection Frequency: Object #1_____

Object #2_____

Object #3_____

Object #4_____

Object #5_____

Comments:_____

_____

_____

CONSEQUENCE PREFERENCE

DATE: _____

TRAINER: _____

NAME: _____ POSITION: _____

INDIVIDUAL CONSIDERATIONS: _____

Trials	LEFT	RIGHT	+/-	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

TOTAL # of Trials: _____

Selected on Right: _____ # Selected on Left: _____

SUMMARY COMMENTS: _____

CONSEQUENCE PREFERENCE HIERARCHY: 1. 2. 3.

4. 5.

BASIC TWO CHOICE DISCRIMINATION TASK

Time Start:_____ Time End:_____

Trainer:_____

Child's Name:_____

Required Response:_____

Antecedent Arrangements:_____

Consequence:_____

	L	R	+/-		L	R	+/-
1.	*ball	hat		21.	*ball	hat	
2.	doll	*cup		22.	doll	*cup	
3.	*book	spoon		23.	*book	spoon	
4.	*phone	cookie		24.	*phone	cookie	
5.	*block	truck		25.	*block	truck	
6.	cup	*ball		26.	cup	*ball	
7.	*hat	doll		27.	*hat	doll	
8.	truck	*book		28.	truck	*book	
9.	*spoon	phone		29.	*spoon	phone	
10.	cookie	*doll		30.	cookie	*doll	
11.	book	*block		31.	book	*block	
12.	*truck	ball		32.	*truck	ball	
13.	*cup	book		33.	*cup	book	
14.	phone	*hat		34.	phone	*hat	
15.	spoon	*cookie		35.	spoon	*cookie	
16.	*doll	cup		36.	*doll	cup	
17.	ball	*truck		37.	ball	*truck	
18.	*cookie	block		38.	*cookie	block	
19.	hat	*phone		39.	hat	*phone	
20.	block	*spoon		40.	block	*spoon	

CONSEQUENCE PREFERENCE-REACH/GRASP DURATION

CHILD:_____ Trainer:_____ Date:_____

Trial	Object	Time Visual	Time Reach	Time Grasp
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				

CONSEQUENCE PREFERENCE

OBSERVATION DATA SHEET

CHILD'S NAME:_____ Date:_____

PARENT:_____ OBSERVER:_____

Day (circle) 1 2 3 Time Started:_____

Segment (circle) 1 2 3 4 Time Stopped:_____

Episode	Location	Context	Activity	Remarks	Cum. Time	Epi. Time
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						

Summary

Location changes _____ Time alone _____ Location preference _____ Time _____

Context changes _____ Time adults _____ Agent preference _____ Time _____

Activity changes _____ Time peers _____ Activity preference _____ Time _____

Name:_____

Date:_____

Trainer:_____

CONSEQUENCE PREFERENCE

OBSERVATIONAL DATA SHEET

Objects					
Time Segments					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
*1 MINUTE					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
*2 MINUTES					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
*3 MINUTES					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
4 MINUTES					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
5 MINUTES					
TOTALS					

Appendix B

APPENDIX B

The information contained in this Appendix is designed to assist you to specifically implement programming to accurately identify potential motivators through interpretation of data collected through programming or observation of student behavior.

There are some severely handicapped students, particularly those who lack movement or may also have difficulty with vision and hearing, for whom no motivators seem apparent when using general procedures. However, motivating conditions can be identified for many of these students when judgments are made on the basis of data collected over several days or longer. Preferences of one object over another, for instance, or for one food type over another, can be indicated through careful and systematic "testing" of items for their degree of preference.

A teacher or programmer must have some idea about what possible objects, toys, foods, etc., should be tried with the student before being able to construct a structured observation. Parents or others who have previously known the student may be helpful in identifying possible items or situations to "test."

The first format in this Appendix is one that can be used with parents to help identify likes/dislikes of their child. This format does not in itself identify motivators but, rather, identifies objects, foods, toys, social events, etc., that may be potentially reinforcing for the student. These items are then systematically tested to determine the reinforcement or motivational hierarchy for that particular student.

Both structured and non-structured situations can be constructed through which preferences for individual students or groups of students can be identified. Non-structured observations require recording of behavior or samples of behavior by an observer who is not directly intervening with the student. This type of situation can be helpful in a classroom where an observer can record behavior demonstrated by more than one student at the same time. Structured observations are most typically recorded by an individual who is directly involved with the student. As such, these types of observations can best be made in a one-on-one situation or with very small groups of students.

Several examples of both structured and non-structured observational situations are presented in this Appendix. In some instances, these formats may be totally adoptable by a teacher or programmer. However, more often, the formats can best function as "examples" which will require adaptation by

the teacher, programmer, or other user in order to be best implemented with particular students. Each example includes:

1) Procedures

2) Blank data sheet

3) Completed data sheet(s) for a severely handicapped student.

4) Interpretation of data to form a consequence preference hierarchy

5) Potential use in programming

Further examples of data sheets are included in Appendix A.

Procedures

EXPLORATORY TWO CHOICE MOTIVATION ASSESSMENT

Step 1: Select 5 objects/foods that are different from one another.

Step 2: Randomly pair objects/foods so that each object is presented once on the right side and once in the left position. No object should follow itself any more than one time.

Step 3: Position student in way that student will be able to perform desired response -- i.e. looking, movement toward object, reach toward object, reach and grasp, etc.

Step 4: Specify desired response including length of contact that must be maintained with object.
Complete data sheet.

Step 5: Present pair of objects in front of student without verbal direction. Wait for student to demonstrate desired response. DO NOT guide, cue, or use any forms of instruction.

Step 6: Present 10 (or more) opportunities for object interaction.

Step 7: Summarize information on data sheet by indicating right/left position preference and selection of each object/food.

Step 8: Provide assessment for at least three sessions of a minimum of 10 trials/opportunities at each session.

Step 9: Summarize all data across sessions.

CONSEQUENCE PREFERENCE

EXPLORATORY TWO CHOICE DISCRIMINATION TASK

Child's Name:_____ Date:_____

Trainer:_____ Time Start_____ Time End_____

Description of Task:

Antecedent Arrangements:_____

Required Response:_____

Consequence Conditions:_____

Trial	Left	Right	Response Latency	Contact Time/Hand	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Totals					

# of choices right side_____

# of choices left side_____

Selection Frequency: Object #1_____

Object #2_____

Object #3_____

Object #4_____

Object #5_____

Comments:_____

_____

_____

CONSEQUENCE PREFERENCE

EXPLORATORY TWO CHOICE DISCRIMINATION TASK

Child's Name: W B Date: 10/13/81

Trainer: L.C. Time Start _____ Time End _____

Description of Task: squeak toy, musical train, FP:TV, music box, ferris wheel

Antecedent Arrangements: Place items on tray; No verbal direction

Required Response: Touch object for 1 second

Consequence Preference: 1 minute interaction w object

Trial	Left	Right	Response Latency	Contact Time/Hand	Comments
1	squeak toy	(TV)	3 sec.	+R	
2	music train	(ferris wheel)	5 sec.	+R	
3	TV	(squeak toy)	2 sec.	+R	
4	(music box)	music train	5 sec.	+R	
5	(ferris wheel)	music box	7 sec.	+L	
6	TV	(squeak toy)	3 sec.	+R	
7	(squeak toy)	music train	2 sec.	+L	
8	music box	(ferris wheel)	3 sec.	+R	
9	music train	(TV)	4 sec.	+R	
10	(ferris wheel)	music box	4 sec.	+R	
Totals	4	6	38 / x̄ 3.8	10	

# of choices right side 6

# of choices left side 4

Selection Frequency: Object #1 3; Object #2 0; Object #3 2; Object #4 1; Object #5 4

Comments: No position preference -
Prefers: ferris wheel

CONSEQUENCE PREFERENCE

EXPLORATORY TWO CHOICE DISCRIMINATION TASK

Child's Name: W. B. Date: 10/14/81

Trainer: L. C. Time Start_____ Time End_____

Description of Task:

Antecedent Arrangements: Place items on tray; No Verbal Direction

Required Response: Touch object for 1 second

Consequence Preference: 1 minute interaction w/ object

Trial	Left	Right	Response Latency	Contact Time/Hand	Comments
1	Squeak toy	(ferris wheel)	5 sec.	+R	
2	(wobble box)	music box	10 sec.	+L	
3	music box	(TV)	2 sec.	+R	
4	(ferris wheel)	wobble box	3 sec.	+L	
5	TV	(squeak toy)	7 sec.	+R	
6	squeak toy	(ferris wheel)	4 sec.	+R	
7	wobble box	(TV)	3 sec.	+R	
8	(ferris wheel)	music box	5 sec.	+L	
9	(TV)	wobble box	4 sec.	+L	
10	music box	(Squeak toy)	2 sec.	+R	
Totals	4	6	45 X 4.5	+10	

# of choices right side 6

# of choices left side 4

Selection Frequency: Object #1 2

Object #2 1

Object #3 3

Object #4 0

Object #5 4

Comments:_____

CONSEQUENCE PREFERENCE

EXPLORATORY TWO CHOICE DISCRIMINATION TASK

Child's Name: W.B. Date: 10/21/81

Trainer: L.C. Time Start _____ Time End _____

Description of Task: squeak toy, music box, ice cream, ferris wheel, pop beads

Antecedent Arrangements: Place items on tray; NC VD

Required Response: Touch object for 1 second

Consequence Preference: 1 minute interaction ± object

Trial	Left	Right	Response Latency	Contact Time/Hand	Comments
1	(Squeak toy)	pop beads	5 sec.	+L	
2	ice cream	(ferris wheel)	10 sec.	+R	seems not
3	pop beads	(Squeak toy)	7 sec.	+R	to cross
4	(music box)	ice cream	5 sec.	+L	midline
5	(ferris wheel)	music box	3 sec.	+L	
6	pop beads	(Squeak toy)	3 sec.	+L	
7	ice cream	(ferris wheel)	7 sec.	+R	
8	Squeak toy	(music box)	8 sec.	+R	
9	(ferris wheel)	ice cream	10 sec.	+L	
10	(music box)	pop beads	3 sec.	+L	
Totals	5	5	$\bar{X}$ 6.1 (45)	10	

# of choices right side 5

# of choices left side 5

Selection Frequency:
Object #1 3
Object #2 0
Object #3 0
Object #4 3
Object #5 4

Comments: No position preference
Seems to prefer music?
Prefers ferris wheel

Data Interpretation

Interpretation Questions:

1. Does student show preference for a particular position -- i.e. right or left position?

   "WB" selects objects equally when placed on the right or left side.

2. Does student show preference for a particular object/food?

   "WB" selected objects as follows across three sessions:

   Object #1 (squeak toy)--- 8 times total (both right and left sides)

   Object #2 (varied across all three days) -- no preference possible

   Object #3 (varied on one day): --selected TV 5 times total out of 8 possible opportunities

   Object #4 (music box) -- 4 times total (both right and left sides)

   Object #5 (ferris wheel) --12 times total (both right and left sides)

   Strong Preference: ferris wheel (selected 100% time, right and left)

   Medium Preference: squeak toy (selected 67%, right and left)
   TV (selected 63%, right and left)

   Low Preference: music box

3. In what instructional programs can strongly preferred motivators be used in age-appropriate and functional ways?

   Ferris wheel can be placed on the floor to be used in mobility program where "WB" is learning to move a scooterboard forward.

   TV can be used in manipulation program where "WB" is learning to turn knobs. Knob manipulation skills can also be included in mobility program such that mobility to gains acess to toy to turn on ferris wheel.

4. What further areas of motivation should be assessed to determine stimulus control?

   Musical toys involving student-activation.

Procedures

OBSERVATIONAL MOTIVATION ASSESSMENT

Step 1: Select three (3) to five (5) objects/foods to be used for assessment.

Step 2: Position student in way that student will be able to perform desired response -- i.e. looking, movement toward object, reach toward object, reach and grasp, etc.

Step 3: Specify desired response including type of interaction required.

Step 4: Present objects in desired order (complete data sheet at top) in front of student. Start stop watch. Observe student interaction with objects. Place a check on the data sheet for each 10 second interval during which the student is appropriately interacting with the object or food.
DO NOT give verbal directions, cue, prompt or use other forms of instruction. DO NOT interact with the student.

Step 5: Total the number of 10 second intervals of interaction with each object, food, etc. presented.

Step 6: Provide assessment for at least three sessions of five minutes in duration.

Step 7: Summarize data across sessions.

Name:_____

Date:_____

Trainer:_____

CONSEQUENCE PREFERENCE

OBSERVATIONAL DATA SHEET

Objects					
Time Segments					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
*1 MINUTE					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
*2 MINUTES					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
*3 MINUTES					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
4 MINUTES					
10 seconds					
20 seconds					
30 seconds					
40 seconds					
50 seconds					
5 MINUTES					
TOTALS					

Name: SH

Date: 4/17/81

Trainer: MC

CONSEQUENCE PREFERENCE

OBSERVATIONAL DATA SHEET

Objects	TV	Beat Drum	pop beads		
Time Segments					
10 seconds			✓		
20 seconds			✓		
30 seconds		✓			
40 seconds		✓			
50 seconds		✓			
*1 MINUTE		✓			
10 seconds	✓	✓			
20 seconds	✓				
30 seconds	✓				
40 seconds			✓		
50 seconds		✓			
*2 MINUTES		✓			
10 seconds		✓			
20 seconds		✓			
30 seconds		✓			
40 seconds		✓			
50 seconds		✓			
*3 MINUTES	✓				
10 seconds	✓				
20 seconds	✓				
30 seconds		✓			
40 seconds		✓			
50 seconds		✓			
4 MINUTES		✓			
10 seconds		✓			
20 seconds		✓			
30 seconds		✓			
40 seconds		✓			
50 seconds		✓			
5 MINUTES		✓			
TOTALS	6	22	3		

Name: SH
Date: 4/18/81
Trainer: HC

CONSEQUENCE PREFERENCE

OBSERVATIONAL DATA SHEET

Objects	TV	Beat-Drum	pop beads		
Time Segments					
10 seconds	✓				
20 seconds	✓				
30 seconds		✓			
40 seconds		✓			
50 seconds		✓			
*1 MINUTE		✓			
10 seconds		✓			
20 seconds		✓			
30 seconds	✓	✓			
40 seconds	✓	✓			
50 seconds	✓	✓			
*2 MINUTES	✓	✓			
10 seconds	✓				
20 seconds	✓				
30 seconds	✓				
40 seconds	✓				
50 seconds	✓				
*3 MINUTES	✓				
10 seconds	✓				
20 seconds	✓				
30 seconds	✓				
40 seconds	✓				
50 seconds	✓				
4 MINUTES	✓				
10 seconds	✓	✓			
20 seconds		✓			
30 seconds		✓			
40 seconds		✓			
50 seconds		✓			
5 MINUTES		✓			
TOTALS	19	16	0		

Name: SH

Date: 4/20/81

Trainer: HC

CONSEQUENCE PREFERENCE

OBSERVATIONAL DATA SHEET

Objects	TV	Beat Drum	pop beads		
Time Segments					
10 seconds	✓				
20 seconds	✓				
30 seconds	✓				
40 seconds		✓			
50 seconds		✓			
*1 MINUTE	✓				
10 seconds	✓				
20 seconds	✓				
30 seconds	✓				
40 seconds	✓				
50 seconds	✓	✓			
*2 MINUTES	✓	✓			
10 seconds		✓			
20 seconds		✓			
30 seconds		✓			
40 seconds			✓		
50 seconds			✓		
*3 MINUTES		✓			
10 seconds		✓			
20 seconds		✓			
30 seconds		✓			
40 seconds		✓			
50 seconds	✓	✓			
4 MINUTES	✓				
10 seconds	✓				
20 seconds	✓		✓		
30 seconds			✓		
40 seconds			✓		
50 seconds			✓		
5 MINUTES			✓		
TOTALS	14	13	7		

Data Interpretation

Interpretation Questions:

1. Does student show preference for a particular position?

Position #1	Position #2	Position #3
39	51	10

"SH" may show slight preference for middle position and/or avoidance of third position.

2. Does student show preference for a particular object/food?

TV	Beat Drum	Pop Beads
39	51	10

"SH" may show slight preference for TV and/or for engaging in beating a toy drum.

3. In what instructional programs can strongly preferred motivators be used in age-appropriate and functional ways?

No conclusions can as of yet be drawn from "SH's" data. Objects should be re-presented in different positions to determine if preference is for position or for particular activity.

4. What further areas of motivation should be assessed?

1. Present same objects for three more sessions with position varied.
2. Try other activities that involve interaction with an object that results in noise -- i.e. hit xylaphone.